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## European project COMANCHE



### 1. Introduction

At the beginning of November we concluded with the second European R&D project – Comanche – in which ten partners co-operated including Gorenje. Based on experiences acquired with the first European project - Estia, the Point program, – Intelligent Home and Innovation Centre, headed by Mr. Boro Jerabek, we undertook again the 26 months cooperation in this project. Similarly, as has been done with our first European project Estia, also in this article the architecture of the Comanche system is presented with Gorenje's contribution to the project realisation, along with exercising the research results within the scope of internal project »Web portal iGorenje and connected Wi-Fi appliance «.

**The second European R&D project – COMANCHE - was successfully concluded at the beginning of November.**

### 2. What is COMANCHE?

The main target of the European project Comanche is the development and validation of generic framework for software configuration management (SCM), which enables the application of features pertaining to the ambient intelligence within domestic environment. In general, it concerns the development of software environment for remote updating, especially of household appliances through the internet and TCP/IP network.

**The COMANCHE project deals with the software development for remote updating, especially of household appliances through the internet and TCP/IP network.**

For this purpose and within the scope of this project we have specified in detail and developed the modular and upgradable architecture, the primary target of which is to provide consistent, safe and favourable SCM services per keenest prices, nowadays met in heterogeneous environments. Services of SCM framework have been developed on the appropriate software platform and on the infrastructure of *KMF – knowledge management framework*, including the following components:

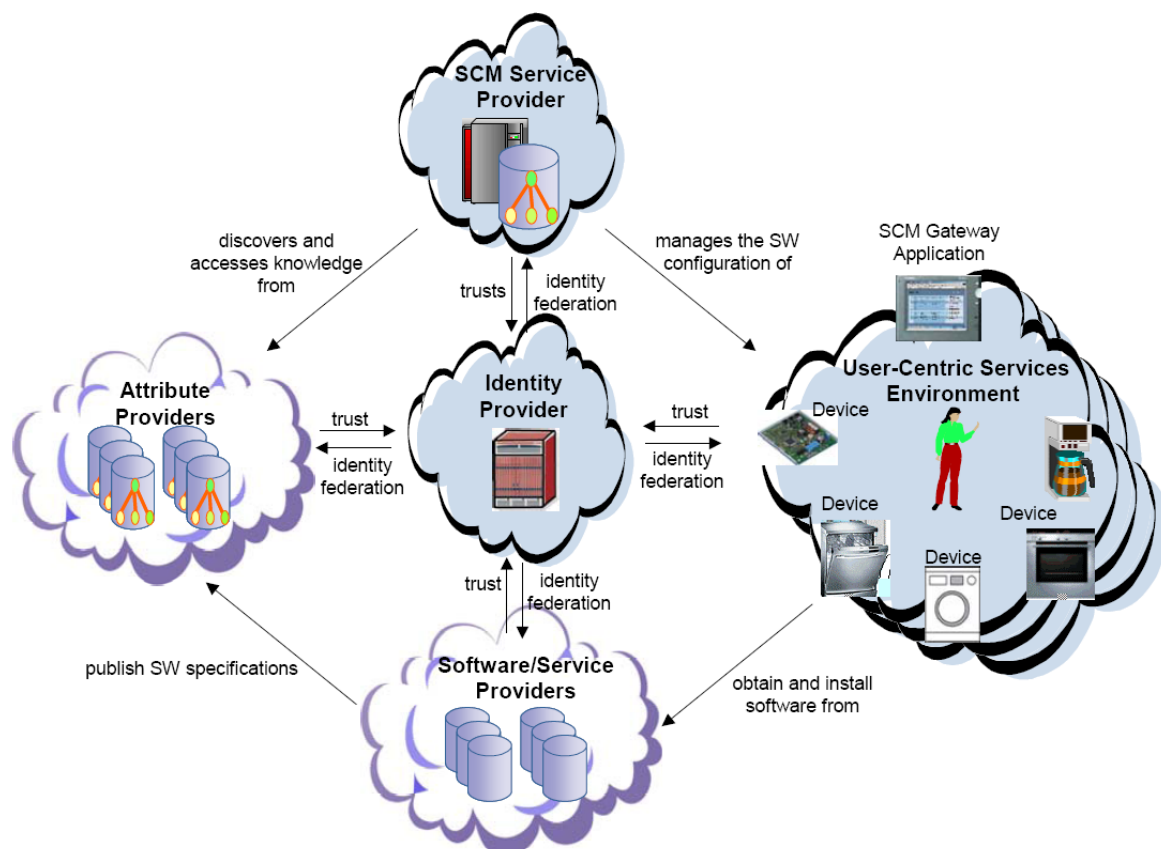
- KMF enables effective organisation along with exploitation of a huge quantity of data – nowadays mostly unorganized and distributed, which refers to SCM framework;

- Modular component-based software architecture with adequate tool can effectively address run-time software management or intelligent networked services;
- A formal modelling methodology and consistency of framework provides analysis of distributed software system in real time.

In this project ten companies cooperated with Gorenje, as follows: Alcatel-Lucent (Germany), Intracom (Greece), Indesit Company (Italy), Teletel (Greece), Solinet (Germany), APEX (Swiss), Cefriel (Italy), COM-DTU (Denmark) and RWTH-AACHEN (Germany). The project started on 1. 9. 2006 and took altogether 26 months.

### 3. Architecture of the system

The concept of the architecture is such that entities interact in the direction of connecting, configuration and development of composed services, nowadays met in domestic environment. Entities and their connections are shown in Figure 1.



**Figure 1: Generic architecture of Comanche project**

The Comanche SCM services framework comprise the following:

- **The user** – employs devices and services inside the domestic environment. The user is generally a legal owner of the environment, in which the system is

installed and is liable for its incorrect and inadequate application. Obligation of the user is subscription or registration at all providers hereunder;

- **SCM service provider** – manages the software configuration of user's services, enables detection and access to the knowledge (user's profile, information on domain, diverse procedures, connected to the SCM framework and other), and is supplied by providers of attributes. SCM has also the possibility of exploiting the dynamically obtained data, e.g. error events and user's location, triggered by the user or other exterior services. The system for advanced assessing of a software modification impact, or the reconfiguration via complex network of different software providers, is also supported;
- **Attribute provider** – provides for different knowledge, necessary for a consistent software configuration management. Such knowledge comprises user's profile, entry or registration data and the data, which enable interoperability between the software and hardware subsystems. Through the attribute provider via private website, the user can adjust-personalize his services and devices, applied in his/hers own environment;
- **Software/service provider** – apart from providing user's devices with updated software, it also maintains the software storage (*repository*), containing diverse serviceable-specific and for devices typical software components. The component is automatically released from the server and installed onto the appropriate device;
- **Identity provider** – authenticates and identifies all previously mentioned entities (user, SCM service provider, attribute provider, provider of software/service solutions), as well as authenticates the identity of devices and that of the software. As the identity provider carries out the connection between all included entities, all such devices and users must have established a confidential link with it.

Distribution to different providers was carried out on the basis of functional perspective. Namely, in practice it is proved that a certain organisation can maintain more than just one type of above enumerated entities. E.g. a company, which is developing software, can assume the role of software solution provider and attribute provider.

The architecture of the Comanche project incorporates also functional entities, needed by a user to carry out such services:

- **SCM gateway** – based on SCM specifications, which were acquired by SCM service provider, harmonizes the software management in the household of a certain user. The gateway decomposes specifications accepted from the whole environment in the device of adequate specification being intended to the agent of SCM device. As to the significance of processing and network abilities the gateway is in general a service, carried out by appropriate device;
- **SCM device agents** – agent-based software, installed in different devices, enables reconfiguration as well as transmission and installation of a new

*firmware*. Agents cooperate with the SCM gateway to acquire data for a specific device and specific contextual information like error and action incidents induced by a user.

#### **4. Gorenje's contribution**

As it has already been written (GIB, February-March 2008, No. 02-03) the European project management is carried out by means of documents (*D – deliverable*) in work packages (WP – work-package). R&D Comanche project was made of six work packages, the same as the first European project - Estia. Gorenje devoted its contribution to D22 chapter, dealing with technical requirements observed from user's perspective and with various verification criteria related to the validity of system operation.

Key contribution of Gorenje within the project was the development of connected low-end washing machine, without advanced features, which the user could be selecting through the control panel of the appliance. Based on the agreement made with other members of the consortia, we decided for the washing machine PG1. We wanted to present the efficacy of up-to-date technologies in connecting different devices, especially by exposing software architecture, enabling the most basic devices their functionalities, which can be met in more sophisticated appliances rich in functions.

**Key contribution of Gorenje within the scope of the project was the development of connectable washing machine.**

Unfortunately, the selection of the appliance was adequate only in its basic construction, and not in software. Consequently, a large part of hardware had to be modified, especially the segment intended to connectivity. In the Point program – Intelligent Home - a detailed adaption was made on existing software and anew developed communication protocol, called XMC (*extended markup connectivity*). The protocol was designed by pointing out its flexibility, which presented a great advantage compared to other earlier developed protocols, as it can be included into any device, thus providing connectivity for a greater number of devices.

**The communication protocol XMC was developed to be embedded into any device thus providing connectivity of a greater number of devices.**

After the adaption has been made and XMC protocol realised, our appliance was ready, enabling even such functionalities, as have been met in high-end appliances. To include the washing machine into the Comanche system, a drive had to be developed, which was installed onto the SCM gateway. Based on OSGi framework, presenting the core of SCM gateway, the realisation of the drive was made in the programming language - Java. Serial connection was selected for communication medium as it completely met the needs of the project.

#### 4.1. Initiative for CECED CHAIN

Due to frozen activities of the CHAIN group (*ceced home appliances interoperating network*) for the year 2007, people in Gorenje strived within the frame of Comanche project to awaken activities, by extending the AIS document (*application interworking group*) and of functional profiles for household appliances with new descriptors (*MID – message interaction descriptor*). The new descriptors would enable complete upgrading of appliance firmware, remote selection of existing version and status during the upgrading procedure (e.g. upgrading in the time of washing-cycle operation is not possible).

Further we suggested the introduction of partial upgrading, comprising only a part of the program, in which the operating profiles of adequate device are written (e.g. washing programs and recipes). Despite the Comanche project and CECED consortium signed the contract for the extension of AIS document, nothing new has happened in the CHAIN group so far – for the time being, the CHAIN project remains inactive.

In this way, with its endeavours, Gorenje gained new experiences and took the advantage of proposals in realisation of its contribution within the frame of the Comanche project.

#### 4.2. Integration and conclusion of the project

Integration of the international Comanche project took place at the headquarters of Alcatel-Lucent Co. in Stuttgart on November 10. A day later, i.e. on 11 November, the result of our two year work was presented to European reviewers. The first day we have made the integration of the washing machine and SCM gateway together with Apex Co., with which we co-operated the most. Preliminary defined scenario for the demonstration included two instances of application; the instance of firmware remote upgrading and the entire procedure of triggering individual programme components after a failure has occurred in the washing machine.

**At the demonstration we presented the instance of firmware remote upgrading and the entire procedure of triggering individual programme components, after a failure has occurred in the washing machine.**

In both instances of application we used a portable computer with adequately installed software, so that it met the requirements of the SCM gateway. At the first demonstration (Figure 2) the user sent the request through a specially adjusted application to the *software/services provider*, which answered with a list of new firmware as well as of earlier ones. In any instance the user was able to decide which version of firmware to apply. Separately, for this purpose we demonstrated a possible application i.e. eco-profile, adjusting the washing programs in time and temperature. In case the user is not satisfied with a new profile, it could be substituted later on with the previous version without any difficulty. This was followed with the demonstration of remote failure diagnostics (Figure 3), demonstrating the response of the system in case of open door of the washing machine. When the user started the washing

program at opened door, the system detected the failure in a very short time and transmitted it immediately to the SCM service provider. A message in the form of electronic mail included the URL link which is equipped with all data of the washing machine, from the time of a failure occurrence up to different visual controls, enabling the service-man a remote control of the device and interactive communication with the user. URL link remains active until the failure is eliminated.

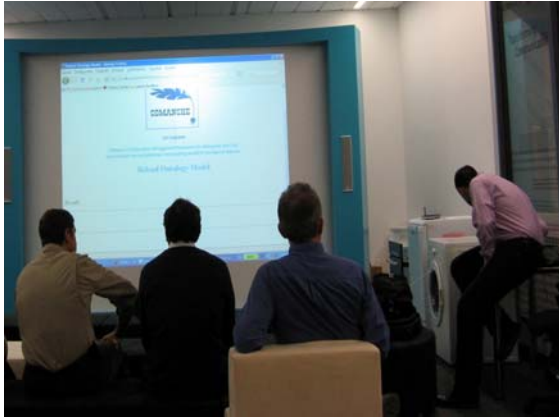


Figure 2: The group of reviewers during the upgrading of firmware on the washing machine PG1



Figure 3: Test of remote diagnostics

## 5. Exploitation plan

With the cooperation in carrying out European projects, Gorenje actually gained a great advantage over its competitors, as in this way we acquire a great deal of new knowledge and experiences, which can be favourably applied in designing one of future generations of appliances. As to the content of the Comanche project, I would like to point out the importance of the internal project » Web portal iGorenje and connectable Wi-Fi appliances«, by means of which we in Gorenje would like to be one of the first on the market, offering to the user a content, enabling remote update of firmware, remote diagnostics, and last but not the least, the addition of diverse services. A user could in this way receive our appliances free of charge, while charging him on monthly basis only for actual consumption according to the time and program use. Such a system is very abundant with contents and opened to the addition of different solutions and ideas, however, with its complexity it requires a lot of development work and studies, on the basis of which we could provide the operative reliability of all mentioned services.

**We in Gorenje would like to be one of the first on the market, offering to the user the content, enabling remote update of firmware, remote diagnostics and, last but not the least, the addition of diverse services.**

The second European project has thus been concluded, and there are new ones waiting in front of the door, which are, beyond doubt, very important for us. In September, we started with the forth European project called BeyWatch; while in the

spring next year, we will conclude the third European project called InHome. More information about interesting events will be released upon the conclusion of InHome project and presented in one of spring editions of GIB.